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THE DEVELOPMENT OF THE MINOR SCALE

BY

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THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

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ENTITLED..... The Development of the Minor Scale

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

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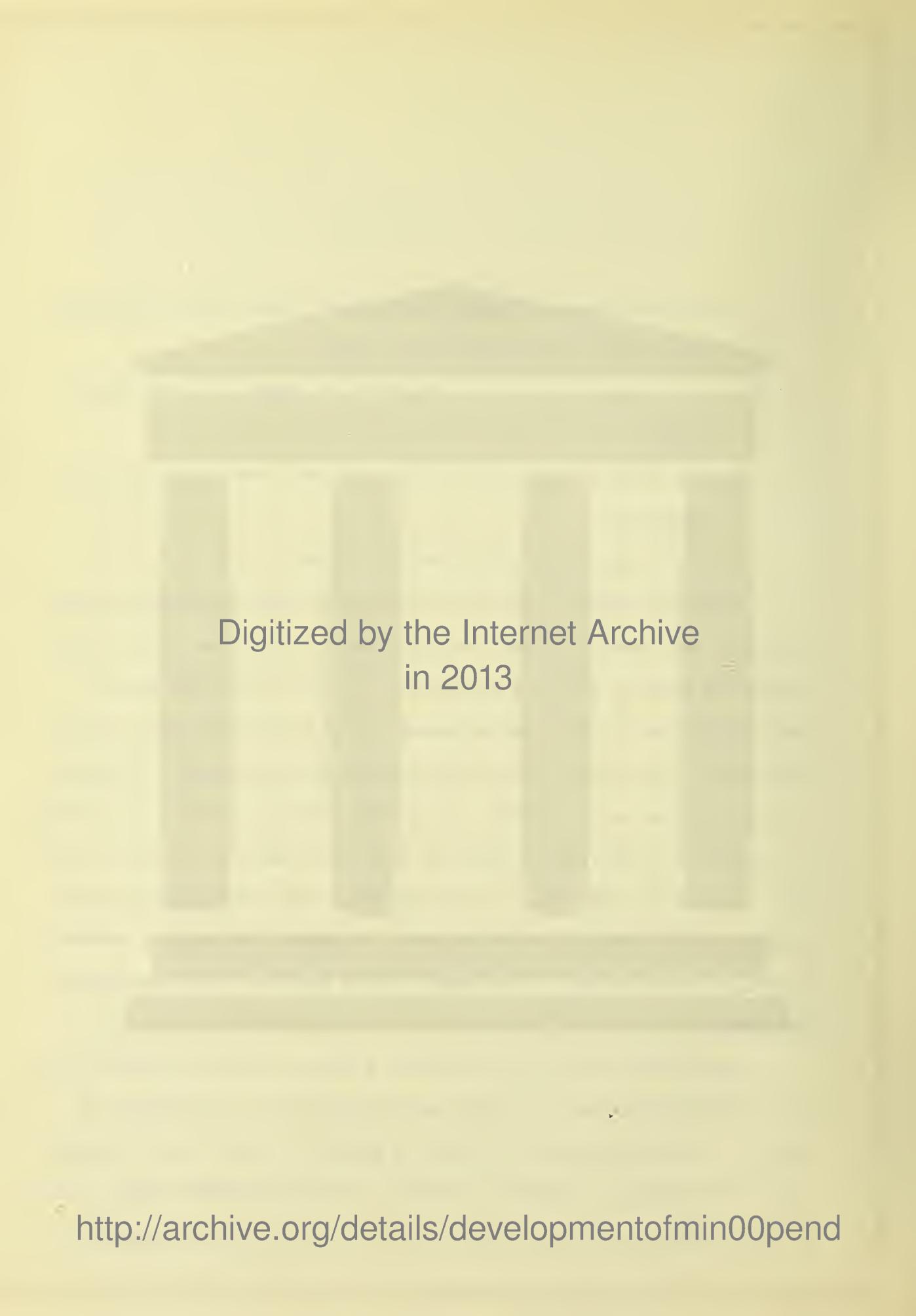
In the development of musical scales four stages may be recognized:

1. The stage of primitive musical scales
2. The stage of instruments mechanically capable of furnishing a scale
3. The stage of theoretical scales - Greek, Arab, Chinese, Hindu, mediaeval
4. The stage of the modern harmonic scale

Roughly speaking, music may be classified among the various nations as uncivilized, semi-civilized, and civilized. Among races that have not reached the point of artistic organization we find uncivilized music.

Among savage peoples music seldom appears as an independent art; it has no real system. One or two figures are repeated again and again. Generally a rudimentary notion of a scale is suggested, although no one type of scale is universal. Scales and the melodies made from them have a downward tendency and the true key note is often doubtful. The tonal effect is minor although major intervals are not unusual. Melodies that imply a pentatonic system are common enough to lead many to urge that the primitive scale was pentatonic.

Long before we are able to speak of a scale, peculiar intervals seem to be especially chosen in singing and in instruments in preference to others. This was especially the case in primitive times, when the melody was too fluctuating to allow of distinct tones and systematic order. Still, in some examples of primitive songs, and above all in the instruments, we



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may note that source intervals were more in favor than others, and thus the frequent use of a certain succession of tones may have influenced the formation of a regular scale.

An ancient pipe that dates from the stone-age shows the first four tones of the diatonic scale. The ancient flutes of the Iroquois had the first six tones of the diatonic scale in minor. A syrinx of stone from ancient Peru had the following succession of tones: E, F[#], G, A, D, C[#], F, A. The old Egyptian flutes which were brought to London and which have been calculated to date from the year 3000 B. C. had a complete diatonic scale. A succession of tones corresponding to our diatonic scale occurs in instruments of the stone age, and we have no reason therefore to conclude that a period of pentatonic scales necessarily preceded the period of heptatonic ones. Helmholtz was of the opinion that not merely the composition of perfect musical works of art, but even the construction of our system of scales, keys, etc, is the work of artistic invention and hence must be subject to the laws of artistic beauty. He bases his assertion on history and says that mankind has been at work on the diatonic system for more than two thousand five hundred years since the days of Terpander and Pythagoras and that the same properties of the human ear could serve as the foundation of very different musical systems. But when Helmholtz wrote these lines some of the most important discoveries about music had not been made. The old Egyptian flutes dating from 2000 B. C. completely surprised the musical world.

In consequence of all these facts we have to abandon the theory that a period of pentatonic scales preceded the present period of diatonic scales. Helmholtz himself seems to be in favor of this modification of his former theory, as the new English edition of his book "The Sensation

"of Tones" contains all the material to support the last mentioned theory.

Many musical historians contend that the diatonic succession of tones has remained stationary up to the present time and has become the constant basis in the development of music because it is the most practical.

Another theory, according to which men in constructing the scale gradually proceeded from a succession of larger intervals (chiefly the pentatonic scale) to the comparatively smaller ones of the diatonic scale, is not in accordance with facts. On the contrary many savages constantly use smaller intervals than we do. According to Davis, Australian savages use quarter tones. The Arabs seem to be still more particular in distinguishing sharps and flats than we are. Arab lutenists had seventeen notes within the octave. Out of this mass of tones they formed diatonic scales according to our principle with flats only or with sharps only. The Sumatrians divide the interval of an octave into six tones without intermediate half-tones. The Chinese know and use the pentatonic and the heptatonic scales; the southern and rural people of China use the former, and the northern and more cultivated circles the latter.

Helmholtz's view that the harmonics in the voice and in the tones of the instruments were influential in setting the notes of our scales is, it seems to me, consistent. Other writers assert that these harmonics and the constitution of the ear must have guided musicians to a harmonic scale.

The broad fact which underlies all study of scales was recognized by the Greek musician, Aristoxeuns, three centuries before the Christian era. He pointed out that the voice in speaking changes its pitch by insensible gradations, while in singing it moves mostly by leaps. It is possible in a song that the voice may always move by leaps and in repeating the song always take the same leaps as closely as can be observed yet never strike

a note which it has struck before. I think this was the character of the songs of the first stage.

Most peoples who have attained any moderate degree of civilization have attempted to limit the number of steps to be taken by the voice in any song, the highest and lowest note, and to fix these steps by rules so that others may learn them and come to an agreement. Various old writers give the rules in vogue among Greek theorists. In the last century Amiot described the Chinese rules while in the last two centuries the rules of Arab, Hindu, Japenese and Siamese musicians have been made accessible. The most familiar rule is: the frequency of vibration of parts of any stretched string is inversely as the length of the parts, provided the tension does not change.

II. As the first cause to settle the type of regular scale was the instruments, I shall try to describe several types and forms of instruments widely used, each embodying a principle of scale building distinctly unlike ours, though sometimes giving a result that seems very familiar. Nearly all these instruments belong to what was called the second or barbarous stage, although a few of them come from countries where musicians have reached a much higher degree of musical culture. A second purpose is to present a new and generic principle of primitive scale building applicable to the types of instruments discussed.

In sharp contrast to that widely used division of a string which we know on the guitar, showing decreasing distances between the frets as the pitch rises, we find many instances of a uniform spacing of the frets through a considerable distance. Instances from four countries may be cited:

1. The well-known architect, Voillet le Duc, gives a figure of a mandolin from the end of the 16th century which shows frets for

the first seven semitones uniformly spaced; the frets for the next five to complete the octave are again uniform, though closer than before, and the following five are also uniformly spaced and still closer.

2. Among the Greek rules given by Ptolemy is one for the division called Diatonic homalon in which, the whole string being twelve units long, the points for stopping would be at 11, 10, 9, and 8, giving C a note between D^b and D, E^b, F, and G. Here it will be noticed the intervals get larger and larger as the pitch rises.
3. Among the instruments described in the Arabic treatise of the famous Al Farabi, who died 950 A. D., is the short-necked tambour of Bagdad, usually having two strings; on this a fret was first placed at 1/8 the length of the string from the upper end, and this space then divided into five equal parts. As the compass on each string was but little over a whole tone, each step was but little over a whole tone. These frets are called "heathen" or "pagan" and the tunes played on them "heathen airs" clearly indicating that there was a scale native to the people whom the Mohammedan armies had conquered. Three hundred years later, about 1250 A. D., Safi-ed-din, a famous musician of Bagdad, wrote a Treatise on Musical Ratios. He based them on string lengths, and in discussing instruments gives a figure of the frets on the neck of the lute and it is noteworthy that these are equally spaced over a distance of a quarter length of the string. He explains how of the ten frets in this short distance, five were fixed by dividing the space between two frets already fixed into halves; one of these, midway between what we should

D and E, if the open string gives C, was called the "Persian middle" and was very much in use in his time. Safi-ed-din further describes a division of the Fourth, like the Greek one already described where the string lengths are 12, 11, 10, 9, saying it is consonant and much used.

4. In India there has been in modern times a curious reversion from any elaborate historical scale of 22 steps to the octave to an equal linear division; one-half of the string on the ritar is bisected; the 1st or end quarter length is then divided into 9 parts, each marked by a fret, and the second quarter length into 13 parts similarly marked. Out of the 23 tones within the octave the player selects a limited number, 5, 6, 7, rarely 8 for any particular tune.

The simple flutes are instruments of a type more primitive and more widely distributed than fretted stringed instruments. All of these instruments embody the law that the frequency of vibration of a column of air in a tube depends mainly on its length, and the variation in length of the air column so as to produce several sounds from one tube is produced by sawing holes in the side of the tube. In practice these holes never can open so freely to the outside air that the portion of the tube beyond them may be considered as removed, so the proper location and diameter of the holes to produce the notes of our scale of even quality are fixed, not by a law as the frets on the guitar are located, but by laborious experimenting to get a standard instrument which is then reproduced with Chinese fidelity.

There are two principle types of flutes -(A) those having the holes spaced at equal distances and (B) those having two groups each of three

equally spaced holes, the interval between the nearest holes of the two groups being greater than that between the holes of each group. As the common primitive method of making the holes is by burning, the holes are generally more uniform in diameter than those on European flutes of a century ago. Illustrations of flutes of type A are found in Engel's Musical Instruments. Fêtes has a cut of the staghorn flute from the stone age with three equidistant holes. So far as is known not one of the peoples from whom these instruments have come has any musical theory, but some of them do have a principle of instrument construction; for a partly educated young Kiowa Indian in Washington a few years ago showed an interviewer how the holes on a flute on which he played were located by measuring three finger-breadths from the lower end to the lower hole and then taking shorter but equal spaces for the succeeding holes. The interpreter added that he had seen the holes spaced by cutting a short stick as a measure. On the Kiowa flute the distance between the centers of the holes is 32 mm. which is two medium finger-breadths.

But it is not only among primitives and prehistoric peoples that such a succession of holes is found. The common fife has it. A Japanese Fouye with seven holes in the collection of instruments at Florence shows holes placed at nearly equal spaces, and has the steps of the scale increasing in length as the pitch rises. From Egypt there have come twenty-five 3 and 4 hole ancient oboes and a few of 5, 6, and more holes.

In Europe there have been many instruments depending on the same general principle of resource in a nearly closed cavity. The most elaborate and beautiful illustrations of instruments of this type are from graves in Central and South America. The United States National Museum has many whistles from Cheriqui in Columbia, most of them giving but a single high

note. Whistles with one or two finger-holes have come from Mexico and San Salvadore, but the most perfect are from Costa Rica. These instruments have a globular body with a bird's head, a mouthpiece about in the position of a bird's tail, and four finger holes on the back symmetrically placed; these holes seem to be precisely equal in diameter and all the tones are clear and distinct. The notes are F, A, C, D, E.

In the American Museum of Natural History in New York half a dozen such three and four hole whistles from the region of Santa Marta, Columbia are to be seen. The particular thing to note about these instruments is that the notes get closer and closer together as the pitch rises.

Striking comparisons have sometimes been made between the Assyrian and early Chinese civilizations. Whatever their relations may have been, it is curious that the only instrument of the resonator type, having several finger holes and coming from a people who had a musical theory is the Hiuen of the Chinese, said to have been invented 2,700 years before our era, and still used in Confucian ceremonies, though rarely seen. It is described as a hollow cone of baked clay about 3 1/2 inches high, having a mouth-hole on one side, and two equal holes on the other. The tones of the scale are re, fa, sol, la, do, re. The pitch of the fundamental comes out D, above middle C, and the other notes, F, G, and A for one side; then starting anew for the other side we get C and D, all within a quarter of a semitone. This is a five step scale, like most of the theoretical Chinese scales.

The West African tribes have little whistles made out of gourds. They have the mouth-hole and two, three, or four finger holes. No dimensions are given. The scale is stated to be A, B, C[#], E, F, but no further measures are given.

From the various types of instrument described there will be some intervals that very closely agree with intervals of our familiar scale. In a few cases this comes about because our scale is principally derived from the Greek theorists who based their scales on proportional string-lengths; so if the unit of equal distance on a simple guitar chances to be an aliquot part of the length of the string from the bridge to the nut, some of the resulting notes will belong to our scale. These coincidences of notes as judged by the ear, will be found much closer and more numerous than when judged mathematically.

The typical Costa Rican four-hole whistle is the most striking example of a series agreeing closely with notes of our scale yet based on an absolutely different principle.

Further, the whole discussion makes it evident that the people who made and used these instruments, or any single type of them, had not that idea of a scale which underlies all our thinking on the subject. Modern Europeans for the sake of harmony have nearly banished all scales but one, and seldom know by what rules the instruments are tuned to furnish this. But for these people the instrument is the primary thing, and to it the rule is applied, while the scale is a result or a secondary thing; and the same rule applied a hundred times may possibly give a hundred different scales. Naturally one does not expect to find much concerted music among people in this stage of development.

The various rules discussed above may be united into one; namely,

The primary principle in the making of musical instruments that yield a scale is the repetition of elements similar to the eye; the size, number, and location of these elements being dependent on the size of the hand and digital expertness of the performer. This principle shows itself

in the occasional equal spaces on the neck of a stringed instrument, and conspicuously in the series of holes on flutes and primitive oboes, while a sense of balance and symmetry added to the repetition appears in the two groups of holes on the flutes. The pitch-determining elements are primarily decorative. No one can examine any collection of primitive wind instruments or drawings of them, without being struck by the way in which the holes often cooperate in the decoration. Simple decoration involving only repetition and symmetrical placing of similar parts is not only found among living primitive peoples everywhere that musical instruments embodying a scale can be found, but is prehistoric. Although no conclusions regarding the mental operations of prehistoric man can be absolutely certain one feels a strong conviction that art appealed first to the eye and later to the ear; that beauty of material form incidentally furnished series of sounds that could be repeated, and could give to the ear and the mind the idea of the definite leaps or steps that Aristoxenes, countless ages afterward, called the characteristic of music. Any influence that may have been exerted on the establishment of scales by the songs of birds, by the recognition of overtones in the sounds of the human voice must have been limited and trivial.

The principle here described never appears as the dominating one among peoples who are known to have had a theory of the scale. The Greek scales are doubtless its direct descendants, though at present it is not known what the influence was that so transformed them and made them depend on ratios, not on difference of lengths.

The music associated with the Greeks, Arabs, Chinese, Hindus, etc., is classed in the stage of semi-civilized music. These peoples have expended enough reasoning power so that their tonal systems of music are

skillful and in a sense artistic. The tone system of the Chinese is very complicated. It is probably based on the tetrachord but in practice it tends to a pentatonic scale. The octave is divided into twelve semi-tones. The tones of the pentatonic scale may be roughly represented by our tones of f, g, a, c, d. They bear fantastic Chinese names, Emperor, Prime Minister, etc. Many Chinese melodies have been transcribed by foreign students and in their quaintness suggest old Scottish songs. The language of the Chinese consists wholly of monosyllables each of which has different meanings, according to the tone of melodic inflection with which it is pronounced. It is very likely that these tones which are four or five in number have relation to song.

The Japanese musical system was derived from China but so long ago that it has now become distinct.

The details of Hindu music are better known than those of the Chinese. The tone-system rests upon a primary division of the octave into seven steps or more exactly twenty-two nearly equal or quarter steps. These latter are not all used in any single scale but serve to define with precision various seven tone scales that differ in the location of the shorter steps as in the mediaeval modes of Europe.

The music associated with Arabic culture and with Mohammedanism is more widely spread than any other of its class. The scale of the Mohammedans divides the octave into seven steps. There are eighteen seven tone scales differing in the location of the shorter steps. The effects produced by these scales are not like ours.

The Arabians divided their scale into seventeen degrees which were produced by means of a series of sixteen fifths (fourths) of pure intonation calculated from the top downwards. This ability to produce the

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consonant intervals pure is significant. They were able to produce harmonies purer than our tempered system. Their system shows an acquaintance not only with the consonance of the octave, the fifth, the fourth, but also with that of the major and minor third, and the minor and major sixth. Every interval is expressed by dividing the length of the deeper toned string by that of the higher toned one. All the intervals are produced from the top downward.

The normal scale of the Indians consisted of seven principal tones. The names of these tones were: (a b c[#] d e f[#] g[#] These normal
(sa ri gu ma pa dha ni.

scales were reproduced by transposition in such a way that their notes retained their names; or else the names of the degrees remained and were therefore transposed; for example, if the pitch of sa were e, then ga = g[#]. They divided the octave into twenty-two parts. Whether this division of the octave into twenty-two parts is really an old Indian one or whether it has been influenced by the Arabian division of the octave into seventeen parts is not determined. The practical tone system of the Indians comprised three octaves.

A glance at our exposition of the Arabian scales or at the Indian tone-system suffices to show that those oriental peoples and the Chinese also must have produced music by no means differing in principle from our own. With them all the diatonic scale is the basis from which they work.

The tone-system of the Greeks was also diatonic. They took up the tonal system already in existence and developed it. In Greek music we find the immediate source of early mediaeval music and thus indirectly of modern music. The work of the Greeks was not only along technical lines but also along scientific and philosophical as well.

As early as the seventh century B. C. the analysis of tones and their relations were undertaken, with studies in the definition of scales. Pythagoras was the chief pioneer of Greek music. From the first the units recognized were the octave and the tetrachord. All tone series were reckoned downward instead of upward as in modern music. The central point of the Greek conception of harmony was clearly the minor key.

Three ways of dividing the tetrachord were used: A, the diatonic, consisting of two whole tones and a half tone, B, the chromatic, consisting of an extra long step with two half steps, and C, the enharmonic, consisting of a double step with two quarter steps. These arrangements may be illustrated through modern letter names thus:

Diatonic E D C B

Chromatic E C[#] C B

Enharmonic E c c^b B

Within a diatonic tetrachord all the three possible arrangements of half steps were utilized - the Dorian, with the half step below, the Phrygian, with it in the middle, and the Lydian with the half step above. These may be illustrated thus:

Dorian E D C B

Phrygian E D C[#] B or D C B A

Lydian E D[#] C[#] B or C B A G

Various octave scales were constructed by joining two similar tetrachords together and adding one step to complete the octave. Seven such modes were used and were formed in three ways according to the position of the added step.

Dorian $\overbrace{E D c B}^{\text{Dorian}} \overbrace{A G F E}^{\text{Dorian}}$

Phrygian $\overbrace{D c B A}^{\text{Phrygian}} \overbrace{G F E D}^{\text{Phrygian}}$

Lydian 'C B A G' 'F E D C'

Hypodorian 'A G F E' 'D C B' A

Hypophrygian 'G F E D' 'C B A' G

Hypolydian 'F E D C' 'B A G' F

Mixolydian 'B A G F' 'E D C' B

The essential difference between these modes lies in the position of the short steps and they should properly begin with the same tone. Of the seven species the Dorian was the most admired, but melodies were composed in all.

What was called the 'complete' system was a scheme of tones comprising two octaves and composed of four Dorian tetrachords. The different modes were understood to be included in this system, each including a particular octave. Four Dorian tetrachords were placed together, each two being conjunct, a diazenxis in the middle, and an additional note added as the lowest, the lower double octave as the highest.

1. Hyperboleon	a'] g'] f'] e'] d'] e']	Extreme tetrachord
2. Diæzengmenon	b']	Disjunct "
3. Meson	a] g] f] e]	Middle "
4. Hypaton	d] c] B]	Lowest "
Proslambanomenos	A	Acquired tone

It is not an accident that the a here lies just in the middle and is the only note which is repeated in the upper and lower octave of the entire

system. The meson or mese had in practical music the importance of the tomi.

Besides this system of fifteen notes to the complete scale the Greeks distinguished one capable of modulation which was produced when the diazenxis was not taken above the mese, but rather by means of the mese as a common note.

The most vexed question presented by ancient Greek music is that of its tonality. Modern music exhibits two tonalities; that of our major and minor modes. Each of these modes admits of tone relations that the other excludes. Ancient Greek music does not admit differences of modality. The only modality to be found in it resembles that of our minor scale without the sharpened leading tone.

The transition from Greek music to that of the twelfth to the fourteenth centuries is not easy to trace or describe. There is an intervening period of 1000 years or more about which nothing adequate can be said. The only kind of music was ritual music, and the Gregorian style was the commonest form then employed. The music of this period falls into two classes (1) responsorial and centiphonal. The responsorial music which is the older of the two classes is characterized by a dominant note, which serves as the note upon which the greater part of the text is recited, but which does not place any emphasis on the Final. It therefore corresponds with the state of development already reached. The antiphonal style was of later production, coming from the East in the fourth century. Here the Final is of greater moment for the antiphon consists of a melody which has no reciting note, and in which tonality is largely determined by the close. It follows then that with the progress of the antiphonal style there was a growth in the importance of the Final. A transform-

ation from simple to elaborate music was taking place as musical proficiency grew within the Roman school. The responsorial class of music was more affected by it than the antiphonal. The elaborate embroideries which completed the chant of the graduals, and other responds tended to obscure the primitive reciting; the Final was brought into great prominence by the process of elaboration. Tonality came to depend more on the Final and less upon the Dominant.

Another change that came about was the appearance of the plagal modes in mediaeval form. The germ of them is seen in the prefix 'Hypo', which characterized the lowest three of the seven modes. The mediaeval plagal modes took their names and ranges but did not have their independent position. Each plagal mode depended upon the corresponding authentic mode; it had the same Final and was so closely related to it that when the modes came to be denoted by numbers it was at first though more natural to put the two under one number only distinguishing them from one another by the term 'Authentic' and 'Plagal'. Thus the Greeks considered them four pairs; but the Latins denoted them by the numbers from one to eight.

			<u>Range</u>	<u>Dom.</u>	<u>Final</u>
1st	First Mode	Authentic Dorian	D-d	a	D
		Plagal Hypodorian	A-a	F	D
3rd	Second Mode	Authentic Phrygian	E-e	b	E
		Plagal Hypophrygian	B-b	a	E
5th	Third Mode	Authentic Lydian	F-f	c	F
		Plagal Hypolydian	C-c	a	F
7th	Fourth Mode	Authentic Myxolydian	G-g	d	G
		Plagal Hypomyxolydian	D-d	c	G

It is to be observed that a new mode has been added to the seven, viz. the Hypomyxolydian, which occupies the same octave as the Dorian but is entirely unlike it in every other respect. There is also a structural difference between Authentic and Plagal. The extra note that was added to the two conjunct tetrachords in the form of a Proslambanomenos came to be regarded as forming a fifth with the lower tetrachord of the two; consequently each authentic mode was looked upon as a pentachord with a tetrachord above it; a plagal mode was viewed as a tetrachord with a pentachord above it. In the former case the dominant was the meeting point of the two and in the latter case the final was the meeting point. Besides its Final or Dominant every mode is distinguished by two other characteristic notes - its mediant and participant. The mediant, so called from its position between the final and dominant, is always the third of the scale in the authentic modes unless that note should happen to be B in which case C is substituted for it. In the Plagal modes its position is less uniform. The participant is an auxiliary note generally in the immediate neighborhood of the mediant in the authentic modes, and in the plagal forms, coincident with the dominant or the corresponding authentic scale. Some modes have a second participant, and one has a second mediant which are not, however, very frequently used.

Each mode is also influenced by certain notes called its modulations or cadences, which are of two kinds. To these are added two or more notes called conceded Modulations among which are found the inverted seventh.

Toward the end of the mediaeval age of musical history there were added to the eight old church modes two new modes with their plagal ones, the names of which were borrowed from the latest transposing scales of the ancients; viz. the lastian and the aeolian with their hypo-modes.

Hypodorian

G, A, B, c, d, e, f, g, a b c'

Hypo-aeolian

E, F, G, A B c d e f g a

The former of the above scales answers to our modern major scale, the latter to our minor.

This form of music that I have just been describing known as the Gregorian style, became the standard form for the ritual of the whole Roman church in which it is still maintained. Originally an adaptation of the Greek system to Latin texts it developed into an expressive and dignified system. It stands apart from other music because (a) based upon ancient scales, all minor and without tonality in the modern sense, (b) devoid of regular rythm, and (c) properly sung in unison without accompaniment. Because this style was adopted by the church, the influence especially of its scales, lasted for centuries.

The advancement of music from the Gregorian style to modern music was long delayed. There was no form of music that could rival the song of the church, and secular music at the best was a plaything not an art. The whole endeavor of musicians was put forth to the enrichment of the chruch service, and the wealthy and powerful princes of France, Italy, Austria, Spain, and England turned the patronage of music at their courts in the same channel with the patronage of the church.

It was in the chapels of northern France and the schools attached to them that the new art of counterpoint was first cultivated. So far as the line of progress can be traced, the art originated in Paris and slowly spread over the adjoining country. About the year 1350 church music had cast off its primitive style and entered upon a stage of greater development. The musical compositions sounded smoother although they had little characteristic expression. From the early part of the 15th century

we date the epoch of artistic polyphony which advanced in perfection until it culminated in the perfected art of the 16th century. Palestina put the finishing touches upon this mediaeval style of music and is known in history as the "saviour of church music."

The marked dissimilarity between the music of the mediaeval school and that of the present era is to a large extent explained by the differences between the key and harmonic systems upon which they are based. In the modern system the relationship of notes to be tonic and the dominant, and the freedom of modulation of notes that do not exist in the first, give opportunities for effect that are not obtainable in music based upon the Gregorian modes for the reason that these modes do not differ in the notes employed but only in the relation of the intervals to the note which forms the key note or final. The music based on this latter system is melodic in character and the resulting combinations of sounds are not conceived as chords built upon a certain tone taken as a fundamental, but rather as consequences of the moving series of single notes, hence purely diatonic. This system admits of chromatic changes but sparingly, chiefly in order to provide a leading tone in a cadence or to obviate an objectionable interval. Consequently there is little of what we should call variety. The theme consists of a few chant-like notes, speedily taken up by one voice after another under control of the principle of imitation. In the "familiar style" the parts move together like blocks of chords of equal length, there is melody in all the voices. In this "familiar style" there is a remote anticipation of harmonic feeling. A vague sense of tonic and dominant is sometimes evident for brief moments but never carried out.

This mediaeval polyphonic music although the most complete example in art of the perfect adaption of means to a particular end could not

long maintain its exclusive prestige. It was to be supplanted by a new style as soon as the transformed secular music was strong enough to react on the church. Now the chief attention was no longer directed to a single chord but to the movement of the separate voices and but little attention was paid to the method of combining the parts by fixing the intervals which they formed according to the requirements of the ear. The man who was the first to find the conception of harmony was Josepho Tarlino, director of music at St. Mark's church, Venice. He recognized and emphasized the fact that the difference between the major and minor chords was not in the kind but in the position of the third. About the same time that the conception of harmony came into existence in Italy a Swiss musician, Henerich Loris of Glarus made the demand that the number of church modes should be increased from eight to twelve. The two new church modes demanded by Glareanus were the Dorian and the Aeolian. The need of these scales had become evident for the four part songs in simple popular form which sprang up about the year 1500 presented examples of harmony which would not agree with any of the old church modes. The new knowledge of harmony had just found out that a satisfactory cadence is possibly only in the harmonic group which places next to the chief chord (now called the tonic) both a relative from the upper series of harmonics (the dominant) and a relative from the lower series (the subdominant). As Polyphony now developed and the harmonization of the modes took place accordingly all kinds of difficulties presented themselves more and more distinctly. With not one of the church modes was it possible to get a satisfactory cadence without deviating from the strictly diatonic; for not one of the church modes shows the tonic chord between two dominants, but places it rather in such a position that it must itself have the sig-

nificance of a dominant. The necessary result was a compromise between regard for the purity of the scales used, and the claims of the ear to a candence, so that in the course of the pieces the dominant feeling was impressed on the cadential harmonies, but at the close of a tonic significance was obtained by the introduction of raised or lowered notes. The licenses permitted in cadences were: (a) For the Dorian, the introduction of b instead of b and of C[#] instead of C, (b) For the Lydian, the introduction of b instead of b, (c) for the Mixolydian the introduction of f[#] for f. Thus the following very different systems arose:

Dorian in the final cadence $\overbrace{g \ b}^b \ d \ f \ a \ c \# \ e$
Tonic

Lydian in the final cadence $\overbrace{b \ b}^b \ d \ f \ \overbrace{a \ c \ e \ g}^e$
Tonic

Mixo-Lydian in the final cadence $\overbrace{c \ e \ g}^e \ \overbrace{b \ d \ f \# \ a}^a$

With the Phrygian nothing similar could be done; the conclusion f, e, with which most Phrygian melodies end would not admit of the introduction of f[#] and to introduce d[#] with f was at that time quite inconceivable. So for the Phrygian one had to be content with a half cadence, the final chord being changed into a major chord (e g[#] b); but even thus, quite a different system was created.

$\overbrace{d \ f}^d \ \overbrace{a \ c \ e}^e \ \overbrace{g \# \ d}^d$
Dominant

From all this it is clear that the adoption of two new church modes in which the arrangement of the harmony such as must have been necessary in the cadences of the old church modes, came as a relief, thus:

$\overbrace{f \ e \ c}^f \ \overbrace{e \ g \ b}^e \ d$
Tonic

and with the admission in cadences, leading tone and in the ascent to this, also the raising of the 6th degree.



Although for some time the new church modes were regarded as at most on an equality with the old ones, yet it was not very long until the relationship was severed, that is, the old ones were admitted to be on equality with the new, although composers put the old ones more and more into the background.

The major scale and one form of the minor scale are the two survivors of the old ecclesiastical modes. In this oldest minor scale form the third, sixth and seventh tones above the tonic are each a half step lower than the same tones of the major scale and form minor intervals, lower tonic, and major intervals to the upper tonic, the reverse of conditions in the major scale. For harmonic and melodic reasons the sixth and seventh degrees of the minor scale (numbering the tones upward from tonic as one) are variable. These variations cannot be regarded as modulatory or chromatic, and the result is three distinct forms of the minor scale.

The instinct for a leading tone and harmony led to the substitution of a major seventh for the minor seventh of the old scale. This gave an augmented second between the sixth and seventh, and a step and a half interval. For melodic reasons the scale was reduced to step and half step seconds by substituting the major for the minor sixth, thus giving both a major sixth and a minor sixth.

This is satisfactory for ascending melodic progressions and yields the major dominant chord in harmony, but it also yields a major subdominant chord which is unsatisfactory and the complete scale in this form descending is objectionable because of the major sixth and the minor sixth being a better leading tone. It is this oldest form of minor scale that

is burdened with a confusing multiplicity of names. Melodie, ascending melodie, natural, normal, consistent, etc, are only part of the names which have been used in attempts to describe some distinguishing feature. These terms can be dropped by remembering that it is not direction of regular tone succession but relation and musical effect in combination as well as succession which suggest scale names. The minor scale is variable and a qualifying name for each of the three distinct forms is needed.

Harmonic minor is a generally acceptable name for the scale form with minor sixth and major seventh. For the minor scale with major sixth and major seventh, melodie minor is largely in use.

"Primitive" is proposed to displace all other names applied with more or less irregularity to the oldest of the three minor scale forms, the one with the minor sixth and minor seventh.

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